

## Lesson 25: Atomic Theory Key Terms

Chemistry with Lab

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1. **Democritus** – (born c. 460 — died c. 370 BC) Greek philosopher. Though only a few fragments of his work survive, he was apparently the first to describe invisible “atoms” as the basis of all matter. His atoms — indestructible, indivisible, incompressible, uniform, and differing only in size, shape, and motion — anticipated with surprising accuracy those discovered by 20th-century scientists.
2. **Atom** – A unit of matter, the smallest unit of an element having all the characteristics of that element and consisting of a dense, central, positively charged nucleus surrounded by a system of electrons.
3. **Atomos** – Greek word meaning indivisible or not able to be cut.
4. **Aristotle** – Greek philosopher who did not follow the teachings of Democritus. He believed in the four earthly elements (fire, earth, air, and water), and proposed a fifth heavenly element (aether).
5. **Dalton** – (born 1766 - died 1844) English scientist who was one of the first to decide that all matter is made up of small particles, or atoms.
6. **Law of Conservation of Mass** – The notion that mass, or matter, can be neither created nor destroyed. According to conservation of mass, reactions and interactions which change the properties of substances leave unchanged their total mass; for instance, when charcoal burns, the mass of all of the products of combustion, such as ashes, soot, and gases, equals the original mass of charcoal and the oxygen with which it reacted.
7. **Law of Definite Proportions** – elements composing a compound are always present in the same proportions by mass.
8. **Law of Multiple Proportions** – law stating that when two elements can combine to form more than one compound the amounts of one of them that combines with a fixed amount of the other will exhibit a simple multiple relation.
9. **Rutherford** – (born 1871 - died 1937) New Zealand physicist who named the nucleus and proton and won the 1908 Nobel prize in chemistry.
10. **Nucleon** – A proton or a neutron, especially as part of an atomic nucleus.
11. **Proton** – A stable, positively charged subatomic particle having a mass 1,836 times that of the electron.
12. **Neutron** – An electrically neutral subatomic particle having a mass 1,839 times that of the electron.

## Lesson 25: Atomic Theory Key Terms (cont.)

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13. **Electron** – A stable subatomic particle having a rest mass of  $9.1066 \times 10^{-28}$  grams and a unit negative electric charge of approximately  $1.602 \times 10^{-19}$  coulombs.
14. **Isotope** – One of two or more atoms having the same atomic number, but different mass numbers, due to a different number of neutrons in the nucleus.
15. **Mass number** – The sum of the number of neutrons and protons in an atomic nucleus.
16. **Photon** – The quantum of electromagnetic energy, regarded as a discrete particle having zero mass, no electric charge, and an indefinitely long lifetime.
17. **Spectroscopy** – Study of spectra, especially experimental observation of optical spectra.
18. **Quantum number** – A set of real numbers assigned to a physical system that individually characterize the properties and collectively specify the state of a particle or of the system.
19. **Orbital** – The wave function of an electron in an atom or molecule, indicating the electron's probable location.
20. **Sublevel** – One or more orbitals in the electron shell of an atom.
21. **Hund's Rule** – If two or more orbitals of equal energy are available, electrons will occupy them singly before filling them in pairs.
22. **Pauli Exclusion Principle** – No two electrons may simultaneously occupy the same quantum state.
23. **Aufbau Principle** – Used to determine the electron configuration of an atom, molecule, or ion. The principle postulates a hypothetical process in which an atom is "built up" by progressively adding electrons. As they are added, they assume their most stable conditions (electron orbitals) with respect to the nucleus and those electrons already there. According to the principle, electrons fill orbitals starting at the lowest available (possible) energy states before filling higher states (e.g. 1s before 2s).